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RESEARCH ARTICLE

Monetary Policy Decisions' Impacts on Bank Leverage and Liquidity Ratios in Türkiye

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Abstract

This study explores how banks in the Turkish banking system design their asset and equity structures in return for monetary policy changes. In this context, between the periods of 2010-2020, we estimate bank leverage and liquidity with multiple monetary policy indicators and by employing two econometric models of static and dynamic panels. According to the results, banks reply to monetary expansion by picking up their leverage ratios on the liability part. On the other hand, banks reply to monetary expansion by enhancing their liquidity positions on the asset part. Also, the originality of our empirical study comes from that; this is the first attempt to evaluate the effects of monetary policy changes simultaneously on both sides of bank balance sheets' in Türkiye.

Keywords: *Monetary Policy, Bank Leverage, Bank Liquidity*

Jel Codes: *E52, E58, G21*

Türkiye'de Para Politikası Kararlarının Banka Kaldıraç ve Likidite Oranlarına Etkileri

Özet

Bu çalışma, Türk bankacılık sisteminin para politikası kararlarına yönelik aktif ve pasif yapılarını nasıl tasarladıklarını incelemektedir. Bu kapsamda, iki ayrı ekonometrik yaklaşım statik ve dinamik panel modellerini kullanarak, çoklu para göstergeleri ile banka kaldıracı ve likiditesini 2010-2020 dönemi için tahmin etmekteyiz. Bulgularımıza göre, parasal genişleme esnasında bankalar yükümlülük tarafında kaldıraçlarını artırarak cevap vermektedir. Öte yandan, bankalar varlık tarafında ise likiditelerini artırarak tepki göstermektedir. Ayrıca, ampirik çalışmamızın özgünlüğü Türkiye'deki para politikası değişikliklerinin banka bilançolarının aynı anda her iki tarafındaki etkilerini inceleyen ilk girişim olmasından kaynaklanmaktadır.

Anahtar kelimeler: *Para politikası, Banka kaldıracı, Banka likiditesi*

Jel Kodu: *E52, E58, G21*

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1. INTRODUCTION

While there's no precise definition in economics, monetary policy can be defined that channelization and administration of monetary supply, including bank loans, via central banks that are empowered generally by public authority (Senn, 1999: 339). If we define monetary policy in a different perspective, it can be said that all regulations and measures which are taken pertaining money. Monetary policy is established in two directions - expansionary and contractionary - by central banks. While expansionary monetary policy consists of steps that are taken for increase aggregate quantity of money on the market, on the other side, contractionary monetary policy (decreasing aggregate money quantity on the market) consists of steps which are taken on the exact opposite side (Çoban, 2009: 376).

By means of multiple monetary instruments, central banks may accomplish various transmission goals via the banking system. But, if we look at the shape of the occurrence and outcomes of the 2008 global financial crisis, it may be claimed that monetary policy is one of the components of the crisis (Dang and Nguyen; 2021: 619). In this context, it is asserted that interventions and operations held by governments have prolonged and worsened the financial crisis. With reference to emergence of the global financial crisis in USA and this crisis' spread around the world via creating a domino effect, USA's deviation from precedents and principals regarding regulation of interest rates, which have been applied and worked for last decade in a good manner, might be shown as an example for this situation. As an another example given to this argument is that, misdiagnosis of the problems in the bank credit markets and thereby having been tried to response inappropriately by focusing on liquidity rather than risk caused to prolong of the crisis. Moreover (if we keep explaining the circumstance in USA) it is said that providing support for certain financial institutions and their creditors but not others in an unplanned way without a clear, understandable framework, made the situation worse as well (Taylor, 2009: 27).

One of the debates that emerged along with the 2008 crisis has been that, the issue of how monetary policy decisions have been reflected to banks' risk-taking desire and have led to the emergence of the risk-taking transmission channel. Risk taking transmission channel can be explained that, pricing and perception of risk stemming from the monetary policy stance at a given time. In here the focal point has been on how policy stance effects the risk appetite and the risk perception of banks. In the center of the debate is that, when interest rates decrease banks may be prone to higher risk-taking and as a result of this situation, a shift may occur in credit supply. In another words, the risk-taking channel brings an increase over in the riskiness of the banks' lending through low quality portfolios. Because, low interest rates might cause banks showing an aggressive attitude in terms of reaching the profit targets. By this way, monetary policy may contribute to financial instability through generating imbalances in the financial system (Aboyadana, 2021: 16).

The nexus between monetary policy and risk-taking appetites of banks has been researched more in the literature day by day through both scholars and policy makers. Yet, it is considered that studies on this connection have been scarce in terms of content and scope. Firstly, it is seen that many studies have been trying to understand the bank risk taking channel's functioning from the point of the banking sector-level financial stability and credit portfolio quality. Besides, limited number of researches concentrate on how monetary policy decisions effect or direct separate sides of balance sheets of the banks. In particular, funding steadiness issue hasn't yet been taken into account in the studies which have been done so far. Secondly, researches have been done until this time are mostly centers around advanced economies, in which have approximately zero or negative interest rates. It needs to be paid attention that, these economies secern from emerging economies like Türkiye, with respect to having settled regulations and well-functioning monetary policy (Dang and Nguyen; 2021: 619-620).

There exist some theories that monetary policy decisions can effect both parts (assets and liabilities) of balance sheets of the banks. As an example can be given to those theories is, on the liabilities side, expansionary monetary policy decisions decrease banks funding costs and hence, increase banks' risk taking appetite by means of encouraging them to have higher leverage ratios (Valencia, 2014: 21; Dell'Ariccia et al., 2014: 66). On the assets part, when banks have fixed rate of return targets, it is considered that low interest rates trigger "search for yield" mechanism and spur banks to lower the amount of their liquid assets that they detained (Rajan, 2006: 518; Borio and Zhu, 2012: 244).

Because of the limited empirical studies in the literature which evaluate the banking data about the mechanisms aforementioned above and very limited researches analyzing the transmission of monetary policy decisions' simultaneous impacts via bank risk taking channel on either bank leverage ratios or liquidity ratios, we think that our study gains importance. So, we analyze monetary policy decisions' effects on bank leverage and liquidity in the Turkish banking market between the periods of 2010-2020, with the aim of filling the gap in the literature. We think that, there exist strong reasons for evaluating this topic in Türkiye. First of all, in Türkiye, interest rates are not as low as in the developed countries. Also, recently in Türkiye, share of the banking sector in the finance sector has reached serious dimensions. This situation shows us that Turkish economy is seriously dependent on banking sector.

The rest of our study has been organized as; in the second part, existing literature, in the third part variables and data set used in the study, in the fourth part model specifications and econometric method, in the fifth part, findings of the research have been mentioned. In the last part, the results have been evaluated, and given some advises.

2. LITERATURE

The pervasive opinion in the literature about effects of monetary policy transmission on banks' risk-taking channel is in the way that monetary easing negatively impacts banks' risk perception and risk tolerance (Rajan, 2006; De Nicolo et al., 2010; Borio and Zhu, 2012; Dell'Ariccia et al., 2014; Bonfim and Soares 2018). A research done by Aboyadana (2021), between the years of 2001-2015 with banks which operate in 37 Sub-Saharan African countries (if it is taken into consideration that these countries are developing countries), resulted that there exists negative interaction between monetary policy and bank risk appetite as well. The result gained from the analysis of the bank balance sheets, it is asserted by the researchers that, monetary policy influences bank balance sheets in two main directions as general.

First of the effects arise from the monetary policy decisions is, on the bank balance sheets' equity (liability) side. It is thought that, the decrease of the interest rates' level decreases the cost of funding, which is a substantial determinant of funding structure of the banks and, therefore, encourages the banks about raising their leverage ratios (Valencia, 2014; Dell'Ariccia et al., 2014). Besides, it's evaluated that, monetary expansion might change banks' equity sides' composition, especially from the stable funding resources towards short-term borrowing direction (Angeloni et al., 2015: 287). To the result of the study done by De Moraes et al. (2016), it's emerged that, monetary easing impacts on banks' risk-taking channel in the form of lessening the banks' capital adequacy ratio and thereby make banks more leveraged and more risky.

A research conducted via De Moraes and De Mendonça in the year 2019, between the years of 2001-2015 and, analyzing 58 quarterly data of 121 banks in Brazil, and also justifying the former study's result about this issue, the finding that, low-interest rates turn banks into more leveraged manner, has obtained as well. According to the results of the study done by De Menna (2020), between the years of 2009-2017, including the data of 3898 banks of 16 countries (except Estonia, Malta and Slovakia because of the insufficient data) in in Euro zone, a statistically significant interaction between the interest rates and bank leverage ratios has emerged.

The second of the effects that arises from the monetary policy decisions is in the direction of the bank balance sheets' asset side. At this point, the impacts of the monetary policy decisions emerge in the form of reallocation of the asset portfolio. Monetary expansion is interpreted as a decrease signal of banks' return that can be gained from the safe (low risky) assets, and that situation decreases returns of the banks and effects them towards direction of the demand increase for assets that are riskier but bring higher return, instead of more liquid but less risky assets (Dell'Ariccia et al., 2014; Angeloni et al., 2015; Bonfim and Soares, 2018; Dang and Nguyen, 2021; Wu et al., 2022). This mechanism shows itself up more conspicuously manner in the circumstances – driving bank managers to more risky credit segments - that bank performance targets' associated with "search for yield" motivation (Diamond and Rajan, 2005; Borio and Zhu 2012; Dang and Nguyen; 2021; Aboyadana, 2021). Also, during the monetary expansion period, banks prefer long-term credits and this decreases bank liquidity (Diamond and Rajan, 2005; Dang and Nguyen, 2021).

Taking into consideration that; increase of the risk-taking behaviors, which observed in the liability side of banks, reflects on the risk-taking behaviors in the asset side of banks as well, have importance. Because, higher leverage ratio means shift of the bank risk towards other creditors (deposit account owners) and this situation means that banks prefer in the direction of increasing more risky investments in the occurrence of limited losses (Angeloni et al., 2015; Valencia, 2014; Dang and Nguyen 2021; De Menna, 2020).

On the other side, monetary policy decisions might impact on different directions too. According to the theory established by Smith (2002), high-interest rates can effect banks' opportunity costs, which may be defined as the cost of holding cash and this may disincline banks from detaining liquid assets. In the similar vein; Kane (1989) claims that because increased interest rates decrease banks' net worth, the strategy of going towards risky assets described as "gambling for resurrection" can be more appealing to the banks. According to the study done by Gan (2004), increasing interest rates reduce banks' franchise value (discounted stream of future profits of the bank) and while this combined with existence of the phenomenon of "deposit insurance warranty", it may cause banks underestimating the "moral hazard problem" and can motivate towards the direction of taking more risk.

According to a research conducted by Lucchetta (2007), aiming to find out how monetary policy decisions effect bank liquidity between the years of 1998-2004 with the data of 5066 banks operating in European countries, it can be said that, confusing findings were obtained. According to this study, a negative correlation was obtained between risk-free interest rates and investments made to liquid assets; however, on the other side, positive correlation between investments made to liquid assets and interbank interest rates has been found.

From the research done by Peydro et al. (2021), approximately 120 banks operating in Italy between the period of 1999-2013, aiming to research how banks build their asset portfolios after monetary shocks, the result emerged that, banks opt for increasing their securities-current assets instead of entering actions of lending during monetary expansion period. To this study; it is thought that, the liquidity injection to banks might not been transmitted to real sector through expanded credit supply. According to this, banks prefer raising their liquidity levels or arranging their portfolios in the form of increasing their securities aiming to generate return to lending real sector. In that study, it has been observed that, banks can enhance their liquidity levels on behalf of holding more liquid assets.

To the data generated from the study conducted by Akkoç and Önder (2021), Central Bank of the Republic of Türkiye's (TCMB) policies, which are in the direction of encouraging the credit growth for the purpose of supporting economic development, the result that, liquidity increase along with enhanced credit volume is effective on risk attitudes of banks, has been emerged.

We think that; as it was mentioned above, the metter of monetary policy decisions' effects on risk-taking behaviors of bank balance sheets' both sides has not become definite as theoretically. Hence, this topic has been keeping on its importance and so worths doing researches on it.

3. DATASET AND VARİABLES

The purpose of this study is to analyze how banks operate in Türkiye design, asset and liability structure of their balance sheets against monetary policy decisions. In this context, 170 bank year observations from 17 banks operating in Turkish banking system have been gathered. The banks, which are the subject of the analysis, constitute a very large proportion (approximately 90%) of the Turkish banking system in terms of asset sizes. Therefore, we believe that this ratio will be sufficient to accurately reflect the state of the Turkish banking system. In this study, data have been arranged as yearly, including 2010-2020 period. Balance sheet data belong to the banks have been picked up from financial reports which take place in their official web pages, The Banks Association of Türkiye (TBB) and Public Disclosure Platform (KAP). Monetary policy interest rates have been generated from the Central Bank of the Republic of Türkiye's Electronic Database (EVDS) and finally macroeconomic variables have been gathered from Turkish Statistical Institute (TUİK). Variables that used in this study and explanations have been presented in Table 1.

Table 1. Variables Used in the Study

Variable	Definition	Data Source and Period
	Monetary policy indicators	
lend_i	Short-term interest rate	TCMB - EVDS 2010-2020
housing_i	Average housing loan interest rates	TCMB - EVDS 2010-2020
redis_i	Rediscount interest rates	TCMB - EVDS 2010-2020
	Bank liquidity and leverage	
Liquidity	Liquid assets/total assets	TBB - KAP 2010-2020
Leverage	Total debt/total assets	TBB - KAP 2010-2020
	Bank-level controls	
Return	Return on average assets	TBB - KAP 2010-2020
Risk	Total loans/total deposits	TBB - KAP 2010-2020
Asset	Natural logarithm of total assets	TBB - KAP 2010-2020
	Macroeconomic controls	
GDP	GDP per capita	TUİK 2010-2020

Variables used in our study have been designated based on the study of Dang and Nguyen (2021). In our research, we have defined monetary policy variables firstly. As of the end of the year 2010, Central Bank of the Republic of Türkiye (TCMB) has been pursuing a strategy on monetary policy practices through more than one interest rate, which can be used as an instrument in a broad corridor. In this system, policy rates that are announced officially and short-term interest rates that banks have exposed de facto can be differentiate from each other. Hence, while determining credit and deposit interest rates, the issue of banks' referencing which short-term interest rate has importance. In line with this issue, Binici et al. (2016) stated in their study that, interbank overnight

interest rate is the principal indicator of the monetary policy. If the monetary policy regime in Türkiye is considered, then interbank overnight interest rate is used as short-term interest rate as monetary policy indicator in the market. Additionally, this indicator shows the real costs of the banks and defines well the changes in the monetary policy (Altunbaş, et al., 2010; Chen, et al., 2017). On the other side, we have taken into consideration rediscount interest rates and average mortgage rates, which may describe TCMB's monetary policy stance. However, since TCMB stopped refinancing valuation in 2011, the mortgage rate was taken into account instead of this rate. These three rates, which have been chosen as monetary policy indicator, strengthen our result' robustness.

For describing bank leverage criterion, in the same vein with Bhagat and Bolton (2008), we have taken into account ratio of total debts to total assets, as well. This ratio indicates that, how much of the banks' assets financed with debts. High leverage rates mean that, a bank is dependent to liabilities rather than equity. In our study, we used the ratio of liquid assets, including cash plus securities, to total assets, taking into account Demirgüç et al.'s (2003) study, as the bank liquidity ratio. It means that when this ratio is higher then, a bank's liquidity will increase and the bank confronts less liquidity risk.

Additionally, for the purpose of considering determinants of bank leverage and bank liquidity, bank control variables have been included in the study. Thus, we have added the variables that show bank size (natural logarithm of total assets), bank return (return on average assets) and bank risk (total loans/total deposits). Regarding to the effect of bank size variable towards bank leverage, it is considered that banks which are well-known by markets can be more leveraged (Gropp and Heider, 2010: 594). When theories about bank return examined, it is seen that profitable banks may decrease asymmetric information problem, which mitigates equity issue cost of banks (Mankiw, 1986; Myers and Majluf, 1984; Dang and Nguyen, 2021: 624). The effect of bank liquidity on bank risk is associated with, when balance sheet structure of the banks deteriorated, money withdrawal of the depositors (Diamond and Rajan, 2001: 291).

In this study, we include - as last variable - gross domestic product per capita factor. This variable controls the impact of the economy, that is time-variant but constant for the banks. Within the periods of the economic vitality, banks' earning desires escalate. Thereby, with the desire os more earning, banks can increase capital levels (Shim, 2013: 761-772).

4. ECONOMETRIC MODEL AND METHODOLOGY

For the purpose of researching the impacts of the monetary policy decisions upon leverage and liquidity ratio of banks' - following the study of Dang and Nguyen (2021) - a model that has been built up with reference to variables mentioned above is, as follows;

$$Balance\_structure_{i,t} = a_0 + a_1 \times MP_t + a_2 \times Bank_{i,t} + a_3 \times Macro_t + u_{i,t} \quad (1)$$

$$Balance_{structure_{i,t}} = a_0 + a_1 \times Balance_{structure_{i,t-1}} + a_2 \times MP_t + a_3 \times Bank_{i,t} + a_4 \times Macro_t + u_{i,t} \quad (2)$$

In our model, dependent variable has been designated as bank liquidity or bank leverage of the bank I's in the year of t. MP variable indicates monetary policy rates, Bank denotes bank control variables. Macro represents macroeconomic situation variable and ui,t symbolizes idiosyncratic error. For the aim of lowering the endogeneity bias and reflecting that banks don't respond to economic decisions instantly, one-period lagged values of the variables have been taken into account.

The dynamic panel method preferred in this study is used intensively in empirical studies. However, in dynamic panel data models, there may arise correlation between lagged values of the dependent

variables and error terms. This situation causes biased and inconsistent estimations of the least squares methods (LS) estimators (Baltagi, 2005: 135). Thus, the optimal method can be used to solve the problems that arise is generalized method of moments (GMM) estimators (Arellano and Bover, 1995; Blundell and Bond, 1998). Among those estimators Difference-GMM Method developed by Arellano and Bond (1991) has been used widely. In this approach, after taking first differences of the all regressors in the model, the lagged values of the regressors in first differences are applied as instruments (Roodman, 2006: 1-44). By this means, the results obtained can be either more efficient or consistent. Lastly, two diagnostic tests may be used to justify Arellano and Bond (1991) GMM estimator. The first of these, which validates the appropriateness of the variables in the model, is Sargan Test; the second of these is Arellano–Bond test, which has no second-order autocorrelation problem (Aklan et al. 2014: 11).

5. EMPIRICAL RESULTS

In Table 2, the descriptive statistics in our study have been summarized. Bank liquidity is distributed ranging from minimum 10.801% to a maximum 66.643%, and bank leverage is distributed ranging from minimum 0.737% to a maximum 0.971%. These results reveal that, there exists a significant variation in the levels of liquidity positions across banks. Regarding to monetary policy variables, it can be seen that, there exist quite large standard deviations and wide ranges of distribution for three indicators. This result indicates us that, significantly fluctuated transformation of interest rates phenomenon exists over time in Türkiye.

Table 2. Summary Statistics

Variable	Mean	S.D.	Min	Max
lend_i	8.846	4.501	3.000	19.260
housing_i	13.072	2.737	9.690	19.290
redis_i	12.477	3.417	8.750	18.500
Liquidity	28.347	12.737	10.801	66.643
Leverage	0.886	0.030	0.737	0.971
Return	1.177	1.481	-11.904	6.462
Risk	99.107	23.197	34.866	155.478
Asset	17.251	1.716	13.712	20.392
GDP	14.290	2.853	10.200	18.600

After the summary statistics, correlation results are given in Table 3. According to the results, it's seen that the coefficients of all independent variables are low. When we examine these relationships in detail, the i_lend variable has the highest relationship between monetary policy indicators and leverage ratios at -0.12 level. On the other hand, the variable with the highest correlation between monetary policy indicators and liquidity ratios again (at -0.27 level) is the i_lend variable. The conclusion to be drawn here indicates that leverage and liquidity rates interact most with short-term interest rates. In addition, it is seen that - among the monetary policy indicators - the GDP variable has the highest relationship (at -0.59 level) with the i_redis variable.

Table 3. Correlation Coefficients Matrix

	Leverage	Liquidity	*lend_i*	*housing_i*	*redis_i*	Return	Risk	Size	GDP
Leverage	1.000								
Liquidity	-0.499	1.000							
lend_i	-0.129	-0.277	1.000						
housing_i	-0.103	-0.240	0.872	1.000					
redis_i	-0.078	-0.097	0.073	0.424	1.000				
Return	-0.406	0.189	-0.100	-0.066	0.049	1.000			
Risk	0.459	-0.699	-0.102	-0.102	-0.196	-0.072	1.000		
Size	0.356	-0.395	0.191	0.148	-0.017	0.248	0.369	1.000	
GDP	0.008	-0.089	0.008	0.200	0.598	0.026	-0.114	0.027	1.000

After the correlation analysis results, in Table 4, we present the test results regarding the establishment of the appropriate model in order to decide between the panel data regression estimators.

Table 4. Panel Data Regression Analysis Estimator Tests

	(1) Leverage	(2) Leverage	(3) Leverage	(4) Liquidity	(5) Liquidity	(6) Liquidity
F Test	16.69 (0.0000)	15.95 (0.0000)	15.76 (0.0000)	9.20 (0.0000)	9.46 (0.0000)	8.49 (0.0000)
Hausman Test	355.40 (0.0000)	73.88 (0.0000)	95.72 (0.0000)	7.57 (0.0057)	27.68 (0.0000)	7.41 (0.0058)

Primarily, as a result of the F Test, which has been done to decide between Fixed Effect Model and Pooled Least Squares Method (Classic Model), null hypothesis has been rejected. According to the result, it has been determined that, the suitable model is fixed effect model.

Afterwards, to decide between Random Effect and Fixed Effect Models, Hausman Test has been applied. According to the result of this test, null hypothesis has been rejected. Thus, it has emerged that, Fixed Effect Model is suitable for the regression model established.

In the Fixed Effect regression estimation, assumption tests have been conducted to determine whether there is an autocorrelation and cross-sectional dependence or not in the model. The results has been presented in Table 5.

Table 5. Assumption Tests

	(1) Leverage	(2) Leverage	(3) Leverage	(4) Liquidity	(5) Liquidity	(6) Liquidity
Heteroskedasticity Test	Chi2=313.4 Prob=0.0000	Chi2=351.9 Prob=0.0000	Chi2=368.5 Prob=0.0000	Chi2=99.59 Prob=0.0000	Chi2=446.53 Prob=0.0000	Chi2=155.11 Prob=0.0000
D.Watson and Baltagi-Wu LBI Tests	1.0552 1.4715	1.1524 1.5318	1.0880 1.5007	1.1714 1.5249	0.9763 1.2190	1.0130 1.3642
Peseran Test	2.735 (0.0062)	2.432 (0.0150)	2.890 (0.0039)	7.716 (0.0000)	6.413 (0.0000)	8.338 (0.0000)

According to the result of the Modified Wald Test conducted for the aim of testing the assumption of heteroskedasticity to the units the null hypothesis has been rejected and the result that there has been heteroskedasticity to the units in the models, has been reached. To identify whether there is an autocorrelation problem in the models or not, it has been benefitted from Modified Bhargava et al., Durbin Watson, Baltagi-Wu LBI - developed by Baltagi and Li (1991) – tests. Because the statistical values in the result of the test are less than 2, autocorrelation problem has been detected in the models. In the last phase, cross-sectional dependence has been determined by Pesaran Test in the fixed effect models built in the study. According to the result of the test, null hypothesis has been rejected and cross-sectional dependence has been observed.

In the study, according to the result of the assumption tests analyzed with Fixed Effect Model there exists, heteroskedasticity, autocorrelation and cross-sectional dependence in the models. If there is a problem in, at least one of, these assumption tests then this causes misestimation of the coefficients. To solve these problems robust estimators are used to. The model has been retested with Driscoll Kraay Robust Estimator, which takes into consideration of heteroskedasticity, autocorrelation and cross-sectional correlation in the models. In the study of Driscoll and Kraay (1998) a model has been developed, which makes up the deficiencies of techniques which rely on large T asymptotics. And also, this model has been in the form of robust to all general forms of spatial and temporal correlation of the standard nonparametric time series covariance matrix estimator. Additionally, this model is a very simple variant of standard heteroskedasticity and autocorrelation of consistent covariance matrix estimation techniques likewise in Newey and West (1987) or Andrews (1991) studies (Driscoll and Kraay, 1998: 550).

The results obtained from the Driscoll-Kraay Robust Estimation Test have been presented in Table 6.

Table 6. Driscoll-Kraay Strength Test

	(1) Leverage	(2) Leverage	(3) Leverage	(4) Liquidity	(5) Liquidity	(6) Liquidity
lend_i	-0.001**			-0.879*		
	(0.033)			(0.008)		
housing_i		-0.001**			-1.116**	
		(0.058)			(0.010)	
redis_i			-0.000**			-0.797*
			(0.096)			(0.003)
Return	-0.008*	-0.008*	-0.008*	0.397	0.561**	0.850*
	(0.000)	(0.000)	(0.000)	(0.158)	(0.026)	(0.001)
Risk	-0.000	-0.000	-0.000	-0.262*	-0.265*	-0.272*
	(0.220)	(0.254)	(0.210)	(0.000)	(0.000)	(0.000)
Asset	0.020*	0.017*	0.013*	-0.367	-2.477	-5.953*
	(0.003)	(0.005)	(0.001)	(0.911)	(0.405)	(0.002)
GDP	-0.000	-0.000	-0.000	-0.630*	-0.397*	0.007
	(0.414)	(0.837)	(0.417)	(0.001)	(0.055)	(0.974)
Cons	0.586*	0.640*	0.691*	76.970	117.01	166.86
R2	0.49	0.47	0.47	0.46	0.42	0.37
Wald	F (5,10)	F (5,10)	F (5,10)	F (5,10)	F (5,10)	F (5,10)
	156.13	209.82	381.67	121.76	205.40	264.91
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000

Note: *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

To the Driscoll-Kraay Robust Test results, the models used in which have fixed effects, it is seen in the models established that monetary policy indicators effect negatively and statistically significantly on leverage and liquidity ratios and in the same time. Also, having looked at the other variables, Return variable has statistically significant and negative effect on leverage ratio and liquidity (as it can be seen in 5th and 6th columns of the table) ratio. When we look at the Risk variable, it seems that it effects liquidity in a negatively and statistically significant manner. On the other hand, while the effect of the Size variable on leverage ratios is significant and positive at the level of 1%, the significant effect on the liquidity can be seen from the model presented in column 6. Finally, it is determined that, GDP variable has statistically significant and negative effect only on the models presented in 4th and 5th columns. The F statistics that indicates the regression results of the models built is significant at the level of 1%.

In Table 7, baseline results have been summarized. Before the results, to ensure GMM Estimator's consistency, Sargan Test has been conducted for determining the validity of the model instruments. According to the results of the preliminary specification tests, in which the validity of dynamic panel data models were tested, Arellano and Bond (1991) AR(1) and AR(2) test statistics were used to determine whether there was an autocorrelation problem in the model. AR(1) and AR(2) test statistics hypothesis testing is established as "there is no autocorrelation problem between error terms". The model in Table 7 shows that, according to the Sargan Test results there is no overdetermination problem. According to the AR(2) test results, the null hypothesis was accepted in all models and the error terms were found to be serially unrelated. In other words, there is no autocorrelation problem between error terms.

Table 7. Baseline Results

	(1) Leverage	(2) Leverage	(3) Leverage	(4) Liquidity	(5) Liquidity	(6) Liquidity
Lagged dependent variable	0.153** (0.010)	0.109** (0.058)	0.208* (0.007)	0.446* (0.000)	0.493* (0.000)	0.518* (0.000)
lend_i	-0.0009* (0.000)			-0.4754* (0.000)		
housing_i		0.0007** (0.026)			-0.7042* (0.000)	
redis_i			-0.0003** (0.014)			-0.5756* (0.001)
Return	-0.009* (0.000)	-0.009* (0.000)	-0.009* (0.000)	0.428 (0.323)	0.575 (0.203)	0.724 (0.119)
Risk	-0.000 (0.744)	4.950 (0.962)	0.000 (0.770)	-0.198* (0.000)	-0.233* (0.000)	-0.268* (0.000)
Asset	0.016* (0.000)	0.011* (0.000)	0.009* (0.000)	-2.222 (0.208)	-3.670** (0.023)	-6.133* (0.000)
GDP	0.000 (0.704)	0.000 (0.256)	0.000 (0.147)	-0.437* (0.002)	-0.310** (0.027)	-0.032 (0.848)
Observation	170	170	170	170	170	170
Banks	17	17	17	17	17	17
AR(1) test	0.000	0.000	0.000	0.000	0.000	0.000
AR(2) test	0.973	0.577	0.484	0.078	0.173	0.202
Sargan test	123.20	138.69	133.27	68.209	64.717	67.149

Note: Note: *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

As it is seen Table 7 consists of the baseline results. Having looked at the results, the models which take place in columns 1-3, monetary policy indicators coefficients are negative and statistically significant. This result exhibits that when the interest rates fall, banks increase their leverage ratios. Generally, when in the periods of the expansionary monetary policy applied by central banks, banks react this via rising their leverage ratios. Valencia (2014) and Dell'Ariccia et al. (2014) have presented this situation with the results that, banks give priority to the higher leverage ratios because of the low funding costs originating from decreasing interest rates. The results obtained from us are consistent with the theories of Valencia (2014) and Dell'Ariccia et al. (2014), and also in accordance with the studies of De Moraes and De Mendonça (2019), Dang and Nguyen (2021) in the literature.

Having looked at the columns 4-6 in Table 7, it can be seen that, monetary policy variables' coefficients are statistically significant and negative. These results reveal that when expansionary monetary policy applied then banks escalate their liquidity levels. In another saying, banks increase their liquid assets. This result in the liquidity model is contrary to the studies in the literature (Borio and Zhu, 2012; Dang and Nguyen, 2021). The results we obtained, have supported with three types of interest rates. In Table 7, coefficients take place in the columns 1-3 indicate that, depending on the interest rate type in the model, a 1% decrease in the interest rates increases bank leverage ratios approximately 0.0003-0.0009 unit. On the other side, having looked at the columns 4-6, it can be interpreted that 1-point decline in the interest rates may cause approximately 0.474-0.705 points of increase to liquidity positions of the banks. These results in the model state that, monetary policy decisions' effects on bank leverage are very low compared to the effects on bank liquidity. Even so, this situation shows the economic consistency of our analysis.

6. RESULTS

This study empirically examines, in the 2010-2020 period, monetary policy decisions' simultaneous effects on bank leverage and bank liquidity ratios in Turkish banking system. In this context, 170 bank years observations comprising of 17 banks' balance sheets have been evaluated by panel data models. The findings imply that, there's a negative and statistically significant correlation between the monetary policy indicators and bank leverage. The explanation of this reaction can be defined that, when in the monetary easing period, banks reply this via rising their leverage ratios. The other finding obtained from our analysis is, the correlation between the interest rates, which are changed by means of monetary policy decisions, and bank liquidity ratios is negative and statistically significant. Based on this result, when easy monetary policy has been applied – meaning that when the interest rates declined – banks react by enhancing their liquidities. Our results are verified through two different econometric models' static and dynamic panels and strong monetary policy indicators.

Because the main purpose of the monetary policy is reaching certain targets and ensuring to financial stability, the changes of the policy rates are crucial for the banks. Hence, we think that the findings which we obtained have importance. On the other side, recently, many important developments have occurred in the Turkish economy. TCMB has declining policy interest rates in an inflationist environment for a while. But the situation that there has no decline at the credit rates of the banks catches the attention. The econometric data that we obtained as a result of the analysis that we conduct concretize the existence of this phenomenon. We think it is possible to explain that, the cause of this phenomenon is, market interest rates are effected from expectations and risks. So, raises of the credit interest rates may direct individuals/households and firms to fulfill their needs before the interest rates increase a lot. Additionally, it is thought that, the liquidity injection to banks might not been transmitted to real sector through expanded credit supply. According to that, banks prefer raising their liquidity levels or arranging their portfolios in the form of increasing their securities, aiming to generate return to lending real sector. Also, it is considered that, banks can enhance their

liquidity levels for detaining more liquid assets. In sum, we are in the opinion that, the difference emerged in our research with the existing literature about the relationship between monetary policy and bank liquidity can be explained in this manner. However, it is emerged that the "search for yield" hypothesis - which states that when monetary easing, banks reduce their liquid assets - does not seem so valid for Turkish banking system and needs to be examined by more empirical studies.

Moreover, the results that we obtained provide important implications for money authorities. Because banks are sensitive to monetary policy decisions then, we suggest that when TCMB adjusts monetary policy it should take into consideration this situation and banking sector. We think that, this attribute of the TCMB can instill confidence to banking sector. On the other side, the negative effects of the expansionary monetary policy on bank risk-taking behavior may be balanced. For example, negative effects might be mitigated or balanced by different bank sizes. Policy makers might be in a navigator position in terms of banks' risk-taking behaviors. So, we think the issue of pursuing the reactions of banks when policy makers are carrying out monetary policy is crucial. If it is defined more detailed, policy makers can promote banks to strengthen their leverage ratios and liquidity positions.

When the existing limited literature about this topic has been taken into consideration, we think that this is the first study analyzing the impacts of the monetary policy decisions simultaneously upon bank leverage and bank liquidity in Türkiye. Hence, when circumstances and dynamics peculiar to Türkiye are taken into consideration, we think that this issue is very important for the developing countries like Türkiye and deserves scrutinizing by comprehensive studies in the future.

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